**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Gummy Bear Lab**

**Introduction:** Atoms and molecules are in constant motion and tend to move from areas of high concentration to areas of lower concentration. The movement of molecules from areas of high concentration to areas of low concentration is known as **diffusion**. Imagine spraying air freshener in a room. At first, the smell is concentrated in one spot. After a while, the molecules diffuse throughout the entire room and the smell becomes less concentrated.

The diffusion of **water molecules** through a selectively permeable membrane is called **osmosis**. Both osmosis and diffusion are forms of **passive transport**; this means they do not need energy to move from areas of high concentration to areas of low concentration.

Gummy bears are made of gelatin, starch, and sugar. Gelatin is a polymer (a large molecule made of many repeating units) that forms large three-dimensional structures that help support jellies, jams, and many other things that you use every day.

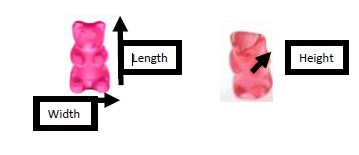
**Goal:** In this lab activity, we will be examining passive transport and the effect of water and solutions on gummy bears.

**Materials:**

* **Day 2**
* Cups with gummy bears
* Paper towels
* Spoon
* Ruler
* Balance
* **Day 1**
* 3 gummy bears (different colors)
* 3 plastic cups
* Water
* Sugar solution
* Salt solution
* Masking tape
* Plastic wrap
* Ruler
* Balance

**Procedure:**

1. When given permission by your teacher, send one member of your group to **gather supplies**.
2. Use a piece of tape to **label each of your 3 cups**. One cup will be “**water**”, the second will be “**sugar solution**” and the third will be “**salt solution**”. Also, be sure to **write your names and class period** on each cup. While you are labeling, the teacher will come around and fill your cups with each solution.
3. **Observe** your gummy bears and record any physical observations (including color, how they feel, etc.) in **data table 1**
4. **Measure each gummy bear** (in cm) from top to bottom (length), from side to side (width), and from front to back (height). **Record your measurements** in **data table 1**.



1. Find the **total volume** of each gummy bear by multiplying the length x width x height. **Record the total volume** of each bear in **data table 1**.
2. Using a balance, carefully **find the mass** (in g) of each gummy bear. **Record the mass** in **data table 1**.
3. **Place one gummy bear in each of your solutions**. Make sure the bears are completely covered by the solutions.
4. **Cover** each cup with plastic wrap.
5. Wait for teacher instructions and then carefully **carry your cups over to the counter** and place them away from any direct sunlight.
6. Gather any supplies you have and return them to the table at the front of the room. **Clean your lab area**. We will finish this activity later in the unit.

-**What do you think will happen to each gummy bear? Why? Write your predictions below**

Bear in Water

Bear in Sugar Solution

Bear in Salt Solution

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**-------------------------------------Day 2-------------------------------------------------------**

1. When your teacher instructs you, **gather your cups** from the back counter and return to your lab groups.
2. Using your spoon, **gently remove the gummy bear from each cup** and place them on a paper towel next to the cup.
3. **Carefully dry each bear** by gently blotting it with a paper towel. Be very careful, gummy bears may be fragile and break.
4. **Observe each gummy bear** and **record any physical observations** in **data table 2**.
5. **Measure the length, width, and height of each gummy bear** using the method described in step 4. **Record your measurements** in **data table 2**.
6. Determine the **total volume** of each gummy bear using the method described in step 5. **Record** your total volume in **data table 2**.
7. Carefully **find the mass of each gummy bear** and **record your masses** in **data table 2**.
8. Gather any supplies you have and return them to the table at the front of the room. **Clean your lab area** and **begin working on your discussion questions**.

**Data Tables:**

1. **Day 1** Data Table

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Gummy Bear 1** | **Gummy Bear 2** | **Gummy Bear 3** |
| **Solution** | Water | Sugar | Salt |
| **Physical Observations (color, feel, etc.)** |  |  |  |
| **Length (cm)** |  |  |  |
| **Width (cm)** |  |  |  |
| **Height (cm)** |  |  |  |
| **Volume (cm3)**  **LxWxH = \_\_\_ cm3** |  |  |  |
| **Mass (g)** |  |  |  |

1. **Day 2** Data Table

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Gummy Bear 1** | **Gummy Bear 2** | **Gummy Bear 3** |
| **Solution** | Water | Sugar | Salt |
| **Physical Observations (color, feel, etc.)** |  |  |  |
| **Length (cm)** |  |  |  |
| **Width (cm)** |  |  |  |
| **Height (cm)** |  |  |  |
| **Volume (cm3)**  **LxWxH = \_\_\_ cm3** |  |  |  |
| **Mass (g)** |  |  |  |

**Discussion Questions:**

1. What is the purpose of measuring the volume and mass of each bear before placing them in the solutions?
2. In order to compare the effects of each solution, we need to calculate the percent change in volume and mass for each gummy bear using the following formulas

**% change in volume** = (final volume – initial volume) / initial volume x 100 = \_\_\_\_\_\_%

**% change in mass** = (final mass – initial mass) / initial mass x 100 = \_\_\_\_\_\_\_\_\_\_\_\_\_%

Calculate the % changes in volume and mass for each gummy bear and record your results in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Solution** | **% Change in Volume** | **% Change in Mass** |
| **Gummy Bear 1** | Water |  |  |
| **Gummy Bear 2** | Sugar |  |  |
| **Gummy Bear 3** | Salt |  |  |

1. What happened to the bear placed in pure water? Why? Explain using osmosis/diffusion.
2. What happened to the bear placed in sugar solution? Why? Explain using osmosis/diffusion.
3. What happened to the bear placed in salt solution? Why? Explain using osmosis/diffusion/
4. What questions do you still have about passive transport?